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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/590,264	01/16/2008	Paul A. Kohl	062012-1860	6083

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EXAMINER	
MOHADDES, LADAN	
ART UNIT	PAPER NUMBER
1795	
MAIL DATE	DELIVERY MODE
02/24/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/590,264	KOHL ET AL.	
	Examiner	Art Unit	
	LADAN MOHADDES	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 December 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11-30* is/are pending in the application.

4a) Of the above claim(s) *12 and 14* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11, 13, and 15-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The objections to Drawings and Specifications as well as Double Patenting rejection and rejection under 35 U.S.C. 112, second paragraph are withdrawn in light of the amendments. Claims 12 and 14 are canceled. Claims 11, 13, and 15-30 are pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 11, 13, 15, 18-21 and 24-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fonash et al. (US Publication 20020020053, hereafter referred to as Fonash) in view of Sasahara et al. (US 6835488, hereafter referred to as Sasahara).

Regarding claim 11, Fonash teaches a fuel cell (paragraph [0004]), comprising: a substrate having a top surface and anode electrodes (applicant's anode current collector) disposed on the top surface (Fig. 9a-b, see substrate with deposited silicon and anode electrode); a membrane disposed on the anode electrodes, wherein the membrane (Fig. 9a-b, see Proton Transport Medium); hollow channels positioned on top surface of the substrate and being defined by the substrate and the surface of the membrane (Fig. 9b), and a catalyst layer is on the surface of the membrane (Fig. 9a-b

and paragraph [0150]); a cathode electrode (disposed above the membrane (Fig. 9a-b). Fonash does not expressly teach that the channels pass through the membrane and therefore channels are also defined by the inner surface of the membrane. However, Sasahara teaches a fuel cell with patterned membrane wherein hollow patterns form channels as thought in the instant application with porous catalyst disposed on the inner surface of the membrane (channels) (see Figs. 3-4 A-B and col 9: ln 7-10 and ln 36-39) for the benefit of providing a fuel cell with a high reaction surface area-to-volume ratio and therefore a high volumetric power density (col 3: ln 10-13). Therefore, it would have been obvious for the person with ordinary skills in the art at the time the invention was made to incorporate the hollow membrane pattern of Sasahara in the fuel cell of Fonash for a fuel cell having high reaction surface area-to-volume ratio and therefore a high volumetric power density.

Regarding claim 18, Fonash teaches platinum catalyst layer is exposed to the channel (paragraph [0150]).

Regarding claim 19, Fonash teaches that the membrane has a thickness of 0.39 μm (Table 9) but is silent regarding the membrane having an area resistivity of about 0.1 to 1000 ohms cm^2. However, area resistivity is dependent on the material property of the membrane and the its thickness and therefore by selecting the same membrane material and adjusting the thickness the same area resistivity as claimed is obtained. Therefore, it would have been within the skill of the ordinary artisan to adjust the thickness or area of the membrane of Fonash to achieve the same area resistivity.

Regarding claims 20 and 26, Fonash also teaches the method for fabricating a fuel cell (paragraph [0031]).

Examiner's Note: Fonash teaches the method of fabricating a fuel cell with the use of patterning through the use of sacrificial layer which results in the structure shown in Fig. 9a-b with un-patterned membrane. The patterning of the membrane with sacrificial layer is thought by Sasahara (Fig. 9A-D and col 8: ln 29-59). As stated in *KSR International* **v**. *Teleflex Inc*. (550 USPQ2d 1385), combining prior art elements according to known methods to yield predictable results establish a prima facie case of obviousness. The Examiner notes that above rationale is merely exemplary. For more information, see MPEP § 2141.

Regarding claim 24, Fonash teaches that the catalyst layer is disposed on portions of the substrate between the sacrificial material portions and the substrate (Fig. 9b and paragraph [0150]).

Regarding claim 25, Fonash teaches that sacrificial material is selected from polymers, silicon dioxide and poly crystalline silicon (glass).

Regarding claims 13, 15, 21, 27 and 28, Fonash teaches a catalyst on anode and cathode (paragraphs [0031] and [0150], also see dotted lines on Fig. 9a-b) but does not disclose that the catalyst layer is porous. However, porous catalytic layers are common in the art for allowing reactant diffusion (as an example see: Suzuki et al. (US Publication 20040247991, paragraph [0003]) and Eikerling et al. (Journal of Electroanalytical Chemistry,1998, Introduction and Fig. 1). Therefore, it would have

been obvious for the person of ordinary skills in the art to use porous catalyst in the fuel cell of Fonash for reactant diffusion.

4. Claims 16-17, 22-23, and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over as being unpatentable over Fonash et al. (US Publication 20020020053, hereafter referred to as Fonash) in view of Sasahara et al. (US 6835488, hereafter referred to as Sasahara) as applied to claims 11, 13, 15, 18-21 and 24-28 above, in further view of Ha et al. (US Publication 20040241520, hereafter referred to as Ha).

Regarding claims 16-17, 22-23, and 29-30, Fonash does not disclose a polymer layer disposed on the side of the membrane opposite the substrate, wherein the cathode current collector and the second porous catalyst layer are disposed on the polymer layer, wherein the polymer layer is selected from perfluorosulfonic acid/polytetrafluoroethylene copolymer, polyphenylene sulfonic acid, modified polyimide, and combinations thereof. In the same field of endeavor, Ha teaches a polymeric membrane such as Nafion or Flemion coated with SiO_2 (paragraph [0021-0022]) for the benefit of improving the fuel cell performance and reducing methanol crossover (paragraph [0017]). Therefore, it would have been obvious for the person with ordinary skill in the art at the time the invention was made to use composite membrane of Ha in the fuel cell of Fonash in view of Sasahara for improving the fuel cell performance.

Response to Arguments

5. Applicant's arguments with respect to claims 11-30 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LADAN MOHADDES whose telephone number is (571)270-7742. The examiner can normally be reached on Monday to Thursday from 8:30 AM to 6:00 PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/LADAN MOHADDES/
Examiner, Art Unit 1795

/PATRICK RYAN/
Supervisory Patent Examiner, Art Unit 1795